We claim:

1. A process for partially oxidizing acrolein to acrylic acid in the gas phase under heterogeneous catalysis by conducting a starting reaction gas mixture comprising acrolein, molecular oxygen and at least one inert gas, and contains the molecular oxygen and the acrolein in a molar $O_2$:$C_3H_4O$ ratio of ≥ 0.5 in a reaction stage over a fixed catalyst bed whose active composition is at least one multimetal oxide comprising the elements Mo and V, in such a way that

   - the fixed catalyst bed is arranged in two spatially successive temperature zones A, B,

   - both the temperature of temperature zone A and the temperature of temperature zone B are a temperature in the range from 230 to 320°C,

   - the fixed catalyst bed consists of at least two spatially successive fixed catalyst bed zones, and the volume-specific activity within one fixed catalyst bed zone is substantially constant and increases sharply in the flow direction of the reaction gas mixture at the transition from one fixed catalyst bed zone to another fixed catalyst bed zone,

   - the temperature zone A extends up to a conversion of the acrolein of from 45 to 85 mol%,

   - on single pass of the starting reaction gas mixture through the entire fixed catalyst bed, the acrolein conversion is ≥ 90 mol% and the selectivity of acrylic acid formation based on converted acrolein is ≥ 90 mol%,

   - the sequence in time in which the reaction gas mixture flows through the temperature zones A, B corresponds to the alphabetic sequence of the temperature zones,

   - the hourly space velocity of the acrolein contained in the starting reaction gas mixture on the fixed catalyst bed is ≥ 70 l (STP) of acrolein/l of fixed bed catalyst · h, and

   - the difference $T^{maxA} - T^{maxB}$, formed from the highest temperature $T^{maxA}$ which the reaction gas mixture has within temperature zone A, and the highest temperature $T^{maxB}$ which the reaction gas mixture has within temperature zone B is ≥ 0°C,

wherein the transition from temperature zone A to temperature zone B in fixed catalyst bed does not coincide with a transition from one fixed catalyst bed zone to another fixed catalyst bed zone.

2. A process as claimed in claim 1, wherein $T^{maxA}$ - $T^{maxB}$ is ≥ 3°C and ≤ 60°C.

3. A process as claimed in claim 1, wherein $T^{maxA}$ – $T^{maxB}$ is ≥ 5°C and ≤ 40°C.

4. A process as claimed in any of claims 1 to 3, wherein the acrolein hourly space velocity on the fixed catalyst bed is ≥ 70 l (STP)/l·h and < 150 l (STP)/l·h.

5. A process as claimed in any of claims 1 to 3, wherein the propene hourly space velocity on the fixed catalyst bed is ≥ 150 l (STP)/l·h and ≤ 300 l (STP)/l·h.

6. A process as claimed in any of claims 1 to 5, wherein the temperature of reaction zone A is from 250 to 300°C.

7. A process as claimed in any of claims 1 to 5, wherein the temperature of reaction zone A is from 260 to 280°C.

8. A process as claimed in any of claims 1 to 7, wherein temperature zone A extends to an acrolein conversion of from 50 to 85 mol%.

9. A process as claimed in any of claims 1 to 8, wherein temperature zone A extends to an acrolein conversion of from 60 to 85 mol%.

10. A process as claimed in any of claims 1 to 9, wherein the $O_2$ : acrolein ratio in the starting reaction gas mixture is ≥ 1.

11. A process as claimed in any of claims 1 to 10, wherein the chemical composition of the active composition used is unchanged over the entire fixed catalyst bed.

12. A process as claimed in any of claims 1 to 11, wherein the entire fixed catalyst bed comprises not more than 4 fixed catalyst bed zones.

13. A process as claimed in any of claims 1 to 12, wherein, when the active composition is uniform over the entire fixed catalyst bed, the volume-specific active composition in the flow direction of the reaction gas mixture increases by at least 5% by weight at the transition from one fixed catalyst bed zone to another fixed catalyst bed zone.

14. A process as claimed in any of claims 1 to 12, wherein, when the active composition is uniform over the entire fixed catalyst bed, the volume-specific active composition in the flow direction of the reaction gas mixture increases by at least 10% by weight at the transition from one fixed catalyst bed zone to another fixed catalyst bed zone.

15. A process as claimed in any of claims 1 to 14, wherein, when the active composition is uniform over the entire fixed catalyst bed, the difference in the volume-specific active composition between the fixed catalyst bed zone having the lowest volume-specific activity and the fixed catalyst bed zone having the highest volume-specific activity is not more than 40% by weight.

16. A process as claimed in any of claims 1 to 15, wherein the last fixed catalyst bed zone in the flow direction of the reaction gas mixture is undiluted and consists only of shaped catalyst bodies.

17. A process as claimed in any of claims 1 to 16, wherein the fixed catalyst bed zone having the highest volume-specific activity extends into temperature zone A.

18. A process as claimed in any of claims 1 to 16, wherein the fixed catalyst bed consists of four fixed catalyst bed zones and the fixed catalyst bed zone with the second highest volume-specific activity extends both into temperature zone A and into temperature zone B.

19. A process as claimed in any of claims 1 to 18, wherein there is no transition from one fixed catalyst bed zone to another fixed catalyst bed in the fixed catalyst bed within the range of $X \pm L \cdot \frac{4}{100}$ where L is the length of the fixed catalyst bed and X is the point within the fixed catalyst bed of transition from temperature zone A to temperature zone B.